QuarkNet Oregon 2012

The Center for High-Energy Physics at the University of Oregon (UOCHEP) hosted the 2012 QuarkNet workshop June 26-27 on the UO campus. This was our 11th summer workshop. The workshop program is given on the next page, and the workshop web page is here:

http://pages.uoregon.edu/rayfrey/QuarkNet/QuarkNet_2012.html

There were three main points of focus for the workshop this year: cloud chamber detectors, the LHC, and classroom activities related to high-energy physics or other current physics research topics. The full list of participants is given in the web page above. The UOCHEP faculty participation was Ray Frey (lead mentor and co-PI), Jim Brau (mentor and PI), Eric Torrence, and Spencer Chang. Senior Scientist Robert Schofield gave a tour of his accelerator and biophysics lab. The faculty talks were very well received and, following usual practice, the presentation files are linked on the web page above, where they are available to teachers. We were also joined by our QuarkNet "regional rep" Kris Whelan. Nine high school teachers joined us this year, including two first-time attendees (Beth Churchill and Alicia Ryan). The other participating teachers were drawn from QuarkNet veterans. All of the teachers are from public schools within about 100 miles of Eugene. As has been the custom, the UO College of Arts and Sciences allocated funds (about 1k$) to cover local expenses (catering, parking, dorm rooms, misc equipment). Some comments on the main themes of the workshop:

Cloud chamber detectors. During the course of the 2011 workshop, we decided that an attractive project for the group would be to build cloud chambers. Cloud chambers are attractive for the high school classroom largely because they provide a relatively inexpensive method to allow students to actually see the particle tracks. This helps to complement the QuarkNet cosmic-ray detectors based on scintillation detectors, for which the particle detection is electronic in nature, and hence somewhat abstract. In addition, the chambers are relatively easy to construct using readily attainable materials and tools, and hence are good classroom projects. The plan we chose was developed at Fermilab: http://quarknet.fnal.gov/resources/QN_CloudChamberV1_4.pdf

We built one chamber in advance of the workshop to evaluate the design and to have one completed, working chamber to demonstrate its operation to the teachers. It worked well, both with liquid nitrogen and dry ice. The construction went well, and all teachers had a completed chamber to take away with them at the end of the workshop.

The LHC. The faculty talks all touched on the LHC and the talk by Eric Torrence focused on it – he showed the preliminary Higgs boson search results from the Atlas collaboration. As has been the case for the last few years, teachers are anxious to look for ways to translate the excitement and student interest in the LHC into learning opportunities. In fact, the announcement of the ``Higgs-like" discovery from CERN on July 4 came shortly after our workshop. So we are expecting the talk files to be especially helpful resources for teachers this coming year.

Classroom activities. As usual, a very popular session was the one in which teachers had an opportunity to share activities and projects from the previous year, and to discuss possible projects for the coming year.

June 27		June 28	
08:00	Gather, catered food and coffee , Wil 410	08:00	Eat and drink, Wil 410
09:00	(Ray) Welcome, workshop goals/plans, cloud chamber plans	09:00	(Kris) General QuarkNet comments
09:30	(Ray) short talk on particle detectors	09:30	(Eric) Latest from the LHC
10:00	Build cloud chambers (Wil 315)	10:30	(All) My favorite class project from 2011-12
		12:00	Lunch
12:00	Lunch (on your own)	1:30	(Spencer) What is the Higgs?; Search for dark matter.
1:30	(Jim) Overview talk on particle physics	3:00	(Robert) Tour of accelerator and leaf-cutter lab
3:30	Cloud chamber demo (Ben Wright)	4:00	Remaining CC or CRD studies; wrap up
4:00	Back to building CC		
5:00	done	5:00	depart

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Faculty participants:

Jim Brau, Spencer Chang, Ray Frey, Eric Torrence; Robert Schofield (Sr Research Assoc)

QuarkNet staff participant:

Kris Whelan, kkwhelan@uw.edu

Local student/staff help:

Ben Wright (demo room), Patrick Bryant

Support:

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UO College of Arts and Sciences (Assoc Dean Dana Johnston)